

Public Goods, Externalities, and Information Asymmetries

This chapter is the first of two on the economic role of government, a topic that was first introduced in Chapter 4. The focus is **market failure** that occurs in our economy. This failure often results in government interventions to provide public goods and services, to address externality problems such as pollution or climate change, and to improve the quality and amount of information for buyers and sellers in the private markets.

The chapter first reviews the characteristics of a **public good**. Recall from Chapter 4 that a private good is characterized by rivalry and excludability, but a public good is not. What is new in Chapter 16 is that you are shown how the demand curve and schedule for a public good are constructed and how the optimal allocation of a public good is determined. The demand and supply curves for a public good are related to the collective marginal benefit and cost of providing the good.

Governments sometimes use **cost-benefit analysis** to determine if they should undertake some specific action or project. This analysis requires the government to estimate the marginal costs and the marginal benefits of the project, and it can be used to decide when such projects should be expanded, contracted, or eliminated.

The second topic of the chapter is **externalities**, situations in market transactions that create negative externalities or positive externalities for parties not involved in the transactions. You learned in Chapter 4 that government can reduce negative externalities to society and increase positive externalities. This general point is now modified by the **Coase theorem**, which shows that government intervention is not always required because in many cases individual bargaining can settle externality disputes. If this solution is not possible, government action with direct controls or taxes may be used.

Pollution is a prime example of a negative externality. Over the years, the government has developed antipollution policies, but the market-based ones merit your attention in your study of economics. You will discover that the government can create a **market for externality rights**, and that there is a rule for the **optimal reduction of an externality**. All of this analysis has direct application to the problem of climate change and what to do about it as it relates to the economy.

Another type of market failure you will encounter in the last major section of this chapter is **asymmetric information**. You have probably never thought about the role of information in the functioning of markets, but you will discover how important information is to both buyers and sellers. For example, buyers need some assurance

about the measurement standards or quality of products that they purchase, be it gasoline or medical care. The government may intervene in some markets to ensure that this information is made available to buyers.

Inadequate information in markets creates problems for sellers, too. In certain markets, such as insurance, sellers experience a **moral hazard problem** because buyers change their behavior and become less careful, and the change in behavior makes the insurance more costly to sellers. There is also an **adverse selection problem** in the insurance market because those buyers most likely to benefit (higher-risk buyers) are more likely to purchase the insurance; therefore this group imposes higher costs on sellers than if the riskers were more widely spread among the population. Actions of sellers to screen buyers would mean that fewer people will be covered by insurance and create situations that may lead to the provision of social insurance by government. Government may provide better information about workplace safety or enforce safety standards to address these information problems.

You should not finish this chapter with the sole thought that all market failures require government intervention and direct control. Some problems do require a specific government action, but other problems may be handled more efficiently or in a more optimal way through individual negotiations, lawsuits, or the use of market incentives. What is important for you to understand is the range of solutions to externality and information problems.

■ CHECKLIST

When you have studied this chapter you should be able to

- ☐ Compare the characteristics of a public good with a private good.
- ☐ Calculate the demand for a public good when given tabular data.
- ☐ Explain how marginal benefit is reflected in the demand for a public good.
- ☐ Describe the relationship between marginal cost and the supply of a public good.
- ☐ Identify on a graph where there is an overallocation, an underallocation, and an optimal allocation of a public good.
- ☐ Use cost-benefit analysis to determine the extent to which government should apply resources to a project or program when you are given the cost and benefit data.
- ☐ Define and give examples of positive and negative externalities.

- ☐ Use supply and demand graphs to illustrate how negative externalities and positive externalities affect the allocation of resources.
- ☐ State the conditions that are necessary for individual bargaining with the Coase theorem and give an example.
- ☐ Explain how liability rules and lawsuits are used to resolve externality problems.
- ☐ Discuss two means government uses to achieve allocative efficiency when there are negative externalities.
- ☐ Identify the four major provisions of the Clean Air Act of 1990 as examples of direct control by government to reduce negative externalities.
- ☐ Describe three government options to correct for the underallocation of resources when positive externalities are large and diffuse.
- ☐ Define the "tragedy of the commons."
- ☐ Determine the price a government agency should charge in a market for externality rights (e.g., cap-and-trade program for air pollution), when given the data for analysis.
- ☐ Compare the advantages of a market for externality rights with the policy of direct government controls.
- ☐ Explain how pollution rights are traded under the Clean Air and Clean Water Acts and in the policies of the EPA.
- ☐ Explain and illustrate with a graph a rule for determining society's optimal reduction of a negative externality.
- ☐ Discuss the economics issues involved in climate change policies and the use of a carbon tax and cap-and-trade programs.
- ☐ Define the terms "information failure" and "asymmetric information."
- ☐ Explain how inadequate information about sellers can cause market failure and give two examples of government response.
- ☐ Define the terms "moral hazard" and "adverse selection."
- ☐ Describe how inadequate information about buyers can create a moral hazard problem, an adverse selection problem, and a workplace problem, and give examples of how government can respond.
- ☐ Cite examples of how information failures are overcome without government intervention.
- ☐ Explain how the Lojack creates a positive externality.

■ CHAPTER OUTLINE

1. Two characteristics of a **private good** are *rivalry* and *excludability*. Rivalry means that consumption of the product by a buyer eliminates the possibility of consumption of that product by another person. Excludability refers to the ability of the seller to exclude a person from consuming the product if the person does not pay for it. A **public good**, such as national defense, is characterized by non-rivalry and nonexcludability. *Nonrivalry* means that once a public good is consumed by one person, it is still available for consumption by another person. *Nonexcludability* means that those individuals who do not pay for the public good can still obtain the benefits from the public good. These two characteristics create a **free-rider problem**

where once a producer provides a public good everyone including nonpayers can receive the benefits.

a. The **demand for a public good** is determined by summing the prices that people are willing to pay collectively for the last unit of the public good at each possible quantity demanded, whereas the demand for a private good is determined by summing the quantities demanded at each possible price. The demand curve for a public good is downsloping because of the law of diminishing marginal utility.

b. The **supply curve of a public good** is upsloping because of the law of diminishing returns; additional units supplied reflect increasing marginal costs.

c. The **optimal allocation** of a public good is determined by the intersection of the supply and demand curves.

(1) If the marginal benefit exceeds the marginal cost, there is an underallocation of a public good.

(2) If the marginal cost exceeds the marginal benefit, there will be an overallocation.

(3) Only when the marginal benefits equal the marginal costs is there an optimal allocation of public goods.

d. Government uses **cost-benefit analysis** to decide if it should use resources for a project and to determine the total quantity of resources it should devote to a project. The **marginal cost = marginal benefit rule** is used to make the decision. Additional resources should be devoted to a project only so long as the marginal benefits to society from the project exceed society's marginal costs. In this case, the total benefits minus the total costs are at a maximum.

2. Market failure can arise from **externalities**, or spillovers, whereby a third party bears a portion of the cost associated with the production or consumption of a good or service.

a. **Negative externalities** result in an *overallocation* of resources to the production of a product. All the costs associated with the product are not reflected in the supply curve. The producer's supply curve lies to the right of the full-cost supply curve.

b. **Positive externalities** result in an *underallocation* of resources to the production of a product. All the benefits from the product are not reflected in the demand curve. The demand curve lies to the left of the full-benefits demand curve.

c. Individual bargaining can be used to correct negative externalities or to encourage positive externalities. The **Coase theorem** suggests that private negotiations rather than government intervention should be the course of action if there is clear ownership of the property, the number of people involved is small, and the cost of bargaining is minimal. When these conditions do not hold, however, it may be necessary for government intervention.

d. The legal system can be used to resolve disputes arising from externalities. This system defines *property rights* and specifies *liability rules* that can be used for *lawsuits* on externality issues. This method has limitations because of the expense, the length of time to resolve the disputes, and the uncertainty of the outcomes.

e. When there is the potential for severe harm to common resources, such as air or water, and when the situation involves a large number of people, two types of government intervention may be necessary.

(1) **Direct controls** use legislation to ban or limit the activities that produce a negative externality. These actions reduce the supply of the products that create the negative externalities to levels that are allocatively efficient.

(2) **Specific taxes** are also applied to productive activity that creates negative externalities. These taxes increase the cost of production, and thus decrease the supply to levels that are allocatively efficient.

f. With positive externalities other government actions may be necessary to correct for the underallocation of resources.

(1) The government can give subsidies to buyers to encourage the purchase or consumption of a good or service.

(2) The government can give subsidies to producers to reduce the cost of production and increase output of a good or service.

(3) When positive externalities are extremely large, government may decide to provide the good or service.

g. There are market-based approaches to externality problems.

(1) The **tragedy of the commons** refers to situations where common resources such as air, water, or oceans are subject to pollution problems because no individual or organization has a monetary incentive to maintain the quality or purity of the resource.

(2) One solution to the problem has been to create a **market for externality rights** (or cap-and-trade program) to internalize the negative externality in a market.

(3) For example, in a cap-and-trade program, the government (a pollution-control agency) might set a limit for the amount of pollution permitted in a region (a cap). This limit means that the supply curve is perfectly inelastic (vertical) at some level of pollution. The demand curve would reflect the willingness of polluters to pay for the right to pollute at different prices. The price for pollution rights would be determined by the intersection of the demand and supply curves. Given a fixed supply curve, an increase in demand because of economic growth in the region would increase the price of pollution rights that could be traded in the market.

(4) This market solution has advantages over direct government controls. It is more efficient and thus reduces society's costs. It puts a price on pollution and thus creates a monetary incentive for businesses to not pollute or to reduce their level of pollution.

(5) Real examples of this cap-and-trade approach are found in provisions in the Clean Air Act of 1990 and policies of the Environmental Protection Agency (EPA).

h. In most cases, the **optimal reduction of an externality** is not zero from society's perspective.

(1) It occurs where the marginal cost to society from the externality and the marginal benefit of reducing it are equal ($MB = MC$).

(2) Over time, shifts in the marginal-cost and marginal-benefit curves change the optimal level of externality reduction.

i. A **climate-change problem** from increased carbon dioxide and other greenhouse gases may be permanently altering climate patterns and will have economic effects on different regions. In designing government policies, economists stress the use of markets to provide price and profit incentives to reduce pollution and increase energy alternatives that are less harmful to the environment. They also advocate evaluating the costs and benefits of alternative policies such as the use of carbon tax or a cap-and-trade program to reduce carbon emissions.

3. Economic inefficiency from information failures can occur in markets. These information failures arise from **asymmetric information**—unequal knowledge that is held by parties to a market transaction.

a. When information involving sellers is incomplete, inaccurate, or very costly, there will be market failures. For example, in the market for gasoline, consumers need accurate information about the amount and quality of gasoline they purchase from sellers. In the market for medical services, it is important that consumers have some assurances about the credentials of physicians. Government can respond to these information failures by such actions as establishing measurement standards and by testing and licensing.

b. Inadequate information involving buyers creates market failures.

(1) A market may produce less than the optimal amount of goods and services from society's perspective because of a **moral hazard problem**, which results when buyers alter their behavior and increase the costs of sellers. For example, the provision of insurance may cause the insured to be less cautious.

(2) An **adverse selection problem** occurs in many markets. In the case of insurance, the buyers most likely to need or benefit from insurance are the ones most likely to purchase it. These higher-risk buyers impose higher costs on sellers. Sellers then screen out the higher-risk buyers, but this action reduces the population covered by insurance in the private market. In some cases, government may establish a social insurance system that is designed to cover a much broader group of the population than would be covered by the private insurers, such as with Social Security.

(3) Market failures occur in resource markets when there is inadequate information for workers about the health hazards or safety of a workplace. Government can act to correct these problems by publishing health and safety information or by forcing businesses to provide more information. The typical approach to this problem has been the enforcement of standards for health and safety on the job.

c. Government does not always need to intervene in the private market to address information problems. Businesses can adopt policies to correct these problems, and some firms or other organizations can specialize in providing important market information for buyers or sellers.

4. (Last Word). The Lojack is a device planted in a car or truck that emits radio transmissions to indicate the location of the vehicle and is used to find a vehicle when it is stolen. There is a direct benefit to the owners because vehicles with a Lojack are recovered at a 90 percent rate versus 60 percent for those vehicle owners without one. Most of the benefit, however, comes to society in the form of a positive externality from the increased arrests of auto thieves that in turn reduce vehicle crime for everyone. Two economists estimate the positive externality from the device to be 15 times greater than the cost of the device.

■ HINTS AND TIPS

1. Review Chapter 4's discussion of public goods and externalities.

2. Make sure you understand the difference between the demand for public and private goods. The **demand for a private good** is determined by adding the quantities demanded at each possible price. The **demand for a public good** is determined by adding the prices people collectively are willing to pay for the last unit of the public good at each possible quantity demanded.

3. Table 16.3 is important because it summarizes the private actions and government policies taken to correct for negative or positive externalities. The government can influence the allocation of resources in a private market by taking actions that increase or decrease demand or supply.

4. Problems occur because information in a market is sometimes asymmetric, which means that there is **unequal** information for sellers or buyers about product price, quality, or other product conditions. Use the examples in the text to help you distinguish between the different types of information problems created by sellers or buyers.

■ IMPORTANT TERMS

cost-benefit analysis	optimal reduction of an externality
marginal cost = marginal benefit rule	climate-change problem
externalities	asymmetric information
Coase theorem	moral hazard problem
tragedy of the commons	adverse selection problem
market for externality rights	

SELF-TEST

■ FILL-IN QUESTIONS

1. Rivalry means that when one person buys and consumes a product, it (is, is not) _____ available for purchase and consumption by another person. Excludability means that the seller (can, cannot) _____ keep

people who do not pay for the product from obtaining its benefits. Rivalry and excludability apply to (private, public) _____ goods, but these characteristics do not apply to _____ goods.

2. With a private good, to compute the market demand you add together the (prices people are willing to pay, quantities demanded) _____ at each possible (price, quantity demanded) _____. With a public good, to compute the collective demand you add together the (prices people are willing to pay, quantities demanded) _____ for the last unit of the public good at each possible (price, quantity demanded) _____.

3. The demand curve for a public good slopes downward because of the law of diminishing marginal (returns, utility) _____. The supply curve for a public good is upsloping because of the law of diminishing _____. The demand curve for a public good is, in essence, a marginal- (benefit, cost) _____ curve; the supply curve for a public good reflects rising marginal _____. The optimal quantity of a public good will be shown by the intersection of the collective demand and supply curves, which means that marginal (benefit, cost) _____ of the last unit equals that unit's marginal _____.

4. In applying cost-benefit analysis, government should use more resources in the production of public goods if the marginal (cost, benefit) _____ from the additional public goods exceeds the marginal _____ that results from having fewer private goods. This rule will determine which plan from a cost-benefit analysis will result in the (maximum, minimum) _____ net benefit to society.

5. One objective of government is to correct for market failures called spillovers or (internalities, externalities) _____. If there is a cost to an individual or group that is a third party to the market transaction, it is a (positive, negative) _____ externality. If there is a benefit to an individual or group that is a third party to a market transaction, it is a (positive, negative) _____ externality.

6. When there are negative externalities in competitive markets, the result is an (over, under) _____ allocation of resources to the production of the good or service. When there are positive externalities, the result is an (over, under) _____ allocation of resources to the production of the good or service.

7. The (liability, Coase) _____ theorem suggests that when there are negative or positive externalities in situations in which the ownership of property is (undefined, defined) _____, the number of people involved

is (large, small) _____, and the costs of bargaining are (major, minor) _____, then government intervention (is, is not) _____ required.

8. The legal system is also important for settling externality disputes between individuals because laws define (political, property) _____ rights and specify (business, liability) _____ rules that can be used for lawsuits. This method, however, has limitations because of its cost, the length of time, and the (certainty, uncertainty) _____ of the results.

9. Government may use direct controls to reduce (positive, negative) _____ externalities by passing legislation that restricts business activity. When direct controls are used, the government is trying to (increase, decrease) _____ the supply curve.

10. The government may correct for the underallocation of resources where (negative, positive) _____ externalities are large and diffuse. This objective can be achieved by (taxing, subsidizing) _____ buyers or producers and through government (provision, consumption) _____ of a good or service.

11. From a demand and supply perspective, the taxes imposed on businesses by government to reduce a negative externality will (increase, decrease) _____ the supply curve from a product and a subsidy given to businesses to expand positive externalities will _____ the supply curve of the product.

12. When no private individual or institution has a monetary incentive to maintain the purity or quality of resources such as air, water, oceans, or lands, it creates an externality problem that is sometime called the tragedy of the (firm, commons) _____. A policy approach to negative externality problems is to create a (market, government) _____ for externality rights.

13. Consider how such a market for pollution rights or cap-and-trade program would work.

a. If the regional government agency sets a limit (a cap) on the amount of air pollution, the supply curve for the air pollution rights would be perfectly (elastic, inelastic) _____.

b. The demand curve for air pollution rights would be (up, down) _____ sloping and intersect the supply curve to determine the (quantity, price) _____ for the right to pollute the air.

c. If the demand for air pollution rights increased over time, then the price or right to pollute would (rise, fall, stay the same) _____ and this right could be traded, but the quantity supplied would _____.

14. Reducing negative externalities comes at a "price" to society, and therefore society must decide how much of a decrease it wants to (buy, sell) _____. Further abatement of a negative externality increases economic efficiency if the marginal cost is (greater than, equal to, less than) _____ the marginal benefit, but it is economically inefficient if the marginal benefit is _____ the marginal cost. The optimal reduction of a negative externality occurs where the society's marginal benefit is (greater than, equal to, less than) _____ society's marginal cost.

15. One of the most controversial and continuing problems with air pollution abatement is the issue of (asymmetric information, climate change) _____. Over the past few decades, there has been a noticeable (increase, decrease) _____ in the temperature of the earth's surface. Economists stress that in designing policies to address this problem, the benefits of reducing greenhouse-gas emissions problems should be (greater than, less than) _____ the costs. They also note that economic adjustment to climate change will occur naturally because of changes in prices and profits in the (environment, market) _____.

16. Markets can produce failures because of (symmetric, asymmetric) _____ information. When information involving sellers is (complete, incomplete) _____ or obtaining such information is (costless, costly) _____, the market will (under, over) _____ allocate resources to the production of that good or service.

17. To correct such problems in the gasoline market, the government establishes quality (prices, standards) _____. In the medical market, the government protects consumers by (taxing, licensing) _____ physicians.

18. Inadequate information involving buyers can lead to two problems. First, if a market situation arises whereby buyers alter their behavior and increase the cost to sellers, (an adverse selection, a moral hazard) _____ problem is created. Second, if buyers withhold information from sellers that would impose a large cost on sellers, _____ problem is created. The moral hazard problem occurs (at the same time, after) _____ a person makes a purchase, but the adverse selection problem occurs _____ the buyer makes a purchase.

19. Another example of information failure occurs in labor markets in which there is incomplete or inadequate information about (productivity, safety) _____. The government will intervene in these situations to enforce (quotas, standards) _____ or provide (health care, information) _____ related to workplace hazards.

20. Private businesses overcome some information problems about the product reliability or quality through (prices, warranties) _____ for products or the (penalizing, franchising) _____ of businesses that make them more uniform. Some businesses and organizations also collect and publish product information that is useful for (sellers, buyers) _____. Despite these actions, there may still be a need for government actions to correct (wage, information) _____ problems and to promote an efficient allocation of society's scarce resources.

■ TRUE-FALSE QUESTIONS

Circle T if the statement is true, F if it is false.

1. Excludability applies to public goods but not to private goods. T F
2. When determining the collective demand for a public good, you add the prices people are willing to pay for the last unit of the public good at each possible quantity demanded. T F
3. When the marginal benefit of a public good exceeds the marginal cost, there will be an overallocation of resources to that public good use. T F
4. The optimal allocation of a public good is determined by the rule that marginal cost (MC) equals marginal revenue (MR). T F
5. "Reducing government spending" means the same as "economy in government." T F
6. An externality is a cost or benefit accruing to an individual or group—a third party—which is external to the market transaction. T F
7. In a competitive product market and in the absence of negative externalities, the supply curve or schedule reflects the costs of producing the product. T F
8. If demand and supply reflected all the benefits and costs of a product, the equilibrium output of a competitive market would be identical with its optimal output. T F
9. There is an underallocation of resources to the production of a commodity when negative externalities are present. T F
10. The inclusion of the positive externalities would increase the demand for a product. T F
11. When negative externalities are involved in the production of a product, more resources are allocated to the production of that product and more of the product is produced than is optimal or most efficient. T F
12. The Coase theorem suggests that government intervention is required whenever there are negative or positive externalities. T F
13. Lawsuits and liability rules create externality problems instead of helping resolve them. T F

14. Taxes that are imposed on businesses that create an externality will lower the marginal cost of production and increase supply. T F

15. Subsidizing the firms producing goods that provide positive externalities will usually result in a better allocation of resources. T F

16. The tragedy of the commons refers to the situation where no private individual or institution has a monetary incentive to maintain the purity or quality of common resources such as air, water, oceans, or lands, and as a result the resources are polluted. T F

17. One solution to the negative externalities caused by pollution is to create a market for pollution rights in which the social costs of pollution are turned into private costs. T F

18. In a market for pollution rights, if a government agency sets a fixed level for pollution or a cap, the supply curve of pollution rights will be perfectly elastic. T F

19. The Clean Air Act established a limited tradable market for pollution rights. T F

20. If a society has marginal costs of \$10 for pollution abatement and the marginal benefit of pollution abatement is \$8, to achieve an optimal amount of the pollution the society should increase the amount of pollution abatement. T F

21. The economic effects of climate change will be uniform across regions of the world. T F

22. Asymmetric information is a market failure that occurs when parties to a market transaction possess unequal knowledge. T F

23. The inspection of meat products by the Federal government for quality is justified on the grounds that it reduces the costs of obtaining information in the market for meat. T F

24. If the provision of government health insurance encourages people to take more health risks, it has created a moral hazard. T F

25. Adverse selection problems primarily result when the government begins enforcing standards for safety in the workplace. T F

■ MULTIPLE-CHOICE QUESTIONS

Circle the letter that corresponds to the best answer.

1. How do public goods differ from private goods? Public goods are characterized by
 - (a) rivalry and excludability
 - (b) rivalry and nonexcludability
 - (c) nonrivalry and excludability
 - (d) nonrivalry and nonexcludability

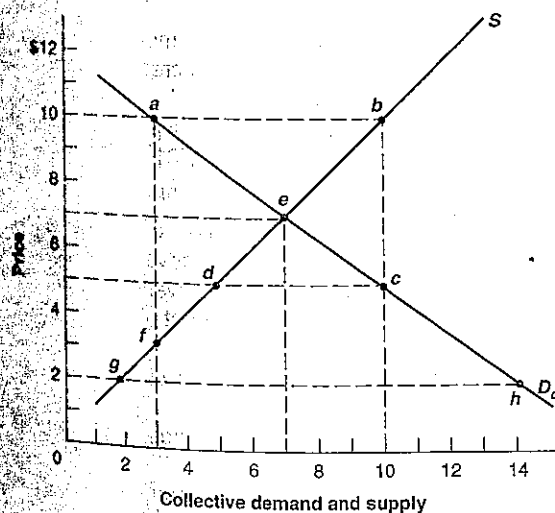
Answer Questions 2, 3, 4, and 5 on the basis of the following information for a public good. P_1 and P_2 represent the prices individuals 1 and 2, the only two people in the

society, are willing to pay for the last unit of a public good. P_c represents the price (or collective willingness to pay) for a public good, and Q_s represents the quantity supplied of the public good at those prices.

Q_d	P_1	P_2	P_c	Q_s
1	\$4	\$5	\$9	5
2	3	4	7	4
3	2	3	5	3
4	1	2	3	2
5	0	1	1	1

2. What amount is this society willing to pay for the first unit of the public good?
 - (a) \$10
 - (b) \$9
 - (c) \$8
 - (d) \$7
3. What amount is this society willing to pay for the third unit of the public good?
 - (a) \$5
 - (b) \$6
 - (c) \$7
 - (d) \$8
4. Given the supply curve Q_s , the optimal price and quantity of the public good in this society will be
 - (a) \$9 and 5 units
 - (b) \$5 and 3 units
 - (c) \$5 and 4 units
 - (d) \$3 and 2 units
5. If this good were a private good instead of a public good, the total quantity demanded at the \$4 price would be
 - (a) 3 units
 - (b) 4 units
 - (c) 5 units
 - (d) 6 units

Answer Questions 6, 7, and 8 for a public good on the basis of the following graph.



6. Where the marginal benefits equal the collective marginal costs is represented by point

- (a) b
- (b) c
- (c) d
- (d) e

7. Which line segment would indicate the amount by which the marginal benefit of this public good is less than the marginal cost?

- (a) ab
- (b) bc
- (c) fa
- (d) gh

8. If 3 units of this public good are produced, the marginal

- (a) cost of \$10 is greater than the marginal benefit of \$3
- (b) cost of \$10 is greater than the marginal benefit of \$5
- (c) benefit of \$10 is greater than the marginal cost of \$5
- (d) benefit of \$10 is greater than the marginal cost of \$3

9. Assume that a government is considering a new anti-pollution program and may choose to include in this program any number of four different projects. The marginal cost and the marginal benefits of each of the four projects are given in the table below. What total amount should this government spend on the antipollution program?

- (a) \$2 million
- (b) \$5 million
- (c) \$17 million
- (d) \$37 million

Project	Marginal cost	Marginal benefit
#1	\$ 2 million	\$ 5 million
#2	5 million	7 million
#3	10 million	9 million
#4	20 million	15 million

10. When the production and consumption of a product entail negative externalities, a competitive product market results in a(n)

- (a) underallocation of resources to the product
- (b) overallocation of resources to the product
- (c) optimal allocation of resources to the product
- (d) higher price for the product

11. A positive externality in the production of some product will result in

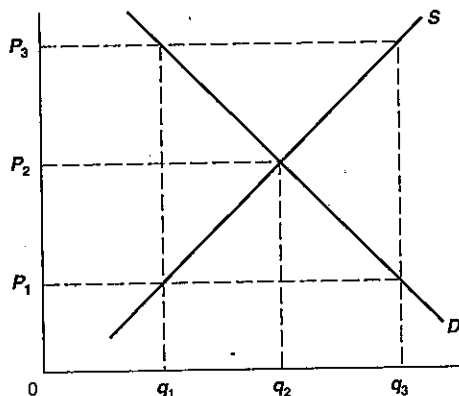
- (a) overproduction
- (b) underproduction
- (c) the optimal level of production if consumers are price takers
- (d) the optimal level of production if consumers are utility maximizers

12. One condition for the Coase theorem to hold is that there be

- (a) clear ownership of the property rights
- (b) a large number of people involved in the dispute

- (c) active government intervention to solve the externality problem
- (d) a sizable cost for bargaining to settle the dispute between the private parties

Use the following graph which shows the supply and demand for a product to answer Questions 13, 14, and 15.



13. If there are neither negative nor positive externalities, the output that results in the optimal allocation of resources to the production of this product is
 - (a) q_1
 - (b) q_2
 - (c) q_3
 - (d) 0
14. If the market for a product was in equilibrium at output level q_2 but the optimal level of output for society was at q_1 , the government could correct for this
 - (a) negative externality with a subsidy to consumers
 - (b) negative externality with a subsidy to producers
 - (c) positive externality with a subsidy to producers
 - (d) negative externality with a tax on producers
15. If the market for a product was in equilibrium at output level q_2 but the optimal level of output for society was at q_3 , the government could correct for this
 - (a) overallocation of resources by direct controls on consumers
 - (b) underallocation of resources through taxes on producers
 - (c) overallocation of resources through a market for externality rights
 - (d) underallocation of resources through subsidies to producers
16. If government were to sell pollution rights, an increase in the demand for pollution rights would
 - (a) increase both the quantity of pollutants discharged and the market price of pollution rights
 - (b) increase the quantity discharged and have no effect on the market price
 - (c) have no effect on the quantity discharged and increase the market price
 - (d) have no effect on either the quantity discharged or the market price

17. The Clean Air Act of 1990

- (a) permits the trading of pollution rights and between firms in an area
- (b) sets stricter limits on the dumping of landfills
- (c) funds research on applications of information and transaction cost
- (d) forces companies to clean up toxic dumps

Use the following table to answer Questions 18, 19, and 20. The data in the table show the marginal cost of pollution abatement to a city for five different levels of pollution abatement.

Quantity of pollution abatement	Marginal cost	Marginal benefit
500 tons	\$500,000	\$100,000
400 tons	300,000	150,000
300 tons	200,000	200,000
200 tons	100,000	300,000
100 tons	50,000	400,000

18. If the city seeks an optimal reduction of the externality, it will select how many tons of pollution abatement?
 - (a) 100
 - (b) 300
 - (c) 400
 - (d) 500
19. If the marginal benefit of pollution abatement increases by \$150,000 at each level because of the community's desire to attract more firms, the optimal level of pollution abatement in tons would be
 - (a) 200
 - (b) 300
 - (c) 400
 - (d) 500
20. What would cause the optimal level of pollution abatement to be 200 tons?
 - (a) technological improvement in production that decreases marginal costs by \$150,000 at each level
 - (b) an increase in the health risk from this pollution that increases marginal benefits by \$200,000 at each level
 - (c) the need to replace old pollution monitoring equipment with new equipment that increases marginal costs by \$200,000 at each level
 - (d) reduction in the public demand for pollution control that decreases marginal benefits by \$100,000 at each level
21. From an economist's perspective, climate change policies that reduce or mitigate the adverse effects of greenhouse-gas emissions should be evaluated by
 - (a) focusing solely on the total amount of the reduction in greenhouse-gas emissions
 - (b) comparing the marginal benefits of such policies with the marginal costs
 - (c) targeting the effects of such changes on how they affect other resources
 - (d) counting the number of days during a year that the earth is below average in its temperature

22. Inadequate information about sellers and their product can cause market failure in the form of

- (a) an increase in the number of market sellers
- (b) an increase in the number of market buyers
- (c) an overallocation of resources to the product
- (d) an underallocation of resources to the product

23. A situation in which one party to a contract alters his or her behavior after signing the contract in ways that can be costly to the other party would be

- (a) an adverse selection problem
- (b) a moral hazard problem
- (c) a tragedy of the commons
- (d) a positive externality

24. If Congress adopted an increase in government insurance on bank deposits, this action would create a moral hazard problem because it may

- (a) lead to careful screening of depositors and the source of their funds
- (b) restrict the amount of deposits made by bank customers
- (c) encourage bank officers to make riskier loans
- (d) reduce bank investments in real estate

25. Assume that individuals who are most likely to benefit substantially from an insurance policy decide to buy one and the insurance company does not know this information. This situation would be an example of

- (a) a free-rider problem
- (b) a principal-agent problem
- (c) a moral hazard problem
- (d) an adverse selection problem

PROBLEMS

1. Data on two individuals' preferences for a public good are reflected in the following table. P_1 and P_2 represent the prices individuals 1 and 2, the only two people in the society, are willing to pay for the last unit of the public good.

Quantity	P_1	P_2
1	\$6	\$6
2	5	5
3	4	4
4	3	3
5	2	2
6	1	1

a. Complete the table below showing the collective demand for the public good in this society.

Q_d	Price	Q_s
1	_____	7
2	_____	6
3	_____	6
4	_____	4
5	_____	3
6	_____	2

b. Given the supply schedule for this public good as shown by the Q_s column, the optimal quantity of this

public good is _____ units and the optimal price is \$_____.

c. When 3 units of this public good are produced, the perceived marginal benefit is \$_____ and the marginal cost is \$_____; there will be an (overallocation, underallocation) _____ of resources to this public good.

d. When 6 units of this public good are produced, the perceived marginal benefit is \$_____ and the marginal cost is \$_____; there is an (underallocation, overallocation) _____ of resources to this public good.

2. Imagine that a state government is considering constructing a new highway to link its two largest cities. Its estimate of the total costs and the total benefits of building 2-, 4-, 6-, and 8-lane highways between the two cities are shown in the table below. (All figures are in millions of dollars.)

Project	Total cost	Marginal cost	Total benefit	Marginal benefit
No highway	\$ 0		\$ 0	
2-lane highway	500	\$ _____	650	\$ _____
4-lane highway	680	_____	750	_____
6-lane highway	760	_____	800	_____
8-lane highway	860	_____	825	_____

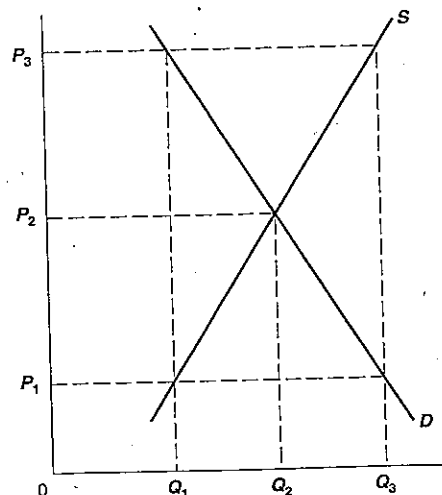
a. Compute the marginal cost and the marginal benefit of the 2-, 4-, 6-, and 8-lane highways.

b. Will it benefit the state to allocate resources to construct a highway? _____

c. If the state builds a highway,

- (1) it should be a _____-lane highway.
- (2) the total cost will be \$_____ million.
- (3) the total benefit will be \$_____ million.
- (4) the net benefit will be \$_____ million.

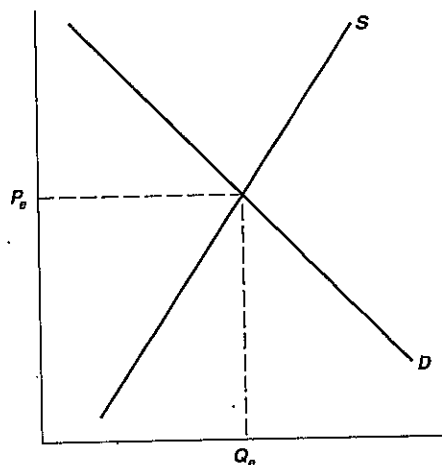
3. The following graph shows the demand and supply curves for a product bought and sold in a competitive market. Assume that there are no positive or negative externalities.



- a. Were this market to produce an output of Q_1 , there would be an (optimal, under, over) _____ allocation of resources to the production of this product.
- b. Were this market to produce Q_3 , there would be an _____ allocation of resources to this product.
- c. The equilibrium output is _____, and at this output there is an _____ allocation of resources.

4. The two following graphs show product demand and supply curves that do *not* reflect either the negative externalities of producing the product or the positive externalities obtained from its consumption.

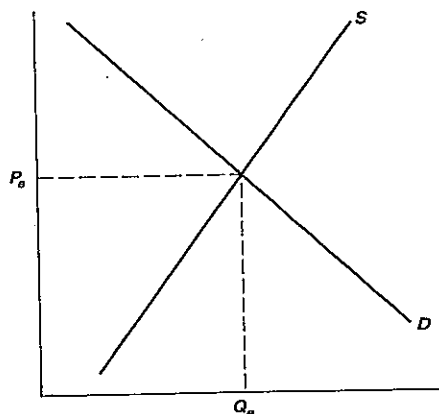
- a. On the first graph, draw in another curve that reflects the inclusion of *negative* externalities.



- (1) Government might force the (demand for, supply of) _____ the product to reflect the negative externalities of producing it by (taxing, subsidizing) _____ the producers.

- (2) The inclusion of negative externalities in the total cost of producing the product (increases, decreases) _____ the output of the product and _____ its price.

- b. On the second graph, draw in a demand curve that reflects the inclusion of *positive* externalities.



- (1) Indicate on the graph the output that is optimal when positive externalities are included.

- (2) To bring about the production of this optimal output, government might (tax, subsidize) _____ consumers of this product, which would (increase, decrease) _____ the demand of the product.

- (3) This optimal output is (greater than, less than, equal to) _____ Q_e ; and the price of the product is (above, below, equal to) _____ P_e .

5. Assume the atmosphere of a large metropolitan area is able to reabsorb 1500 tons of pollutants per year. The following schedule shows the price polluters would be willing to pay for the right to dispose of 1 ton of pollutants per year and the total quantity of pollutants they would wish to dispose of at each price.

Price (per ton of pollutant rights)	Total quantity of pollutant rights demanded (tons)
\$ 0	4000
1000	3500
2000	3000
3000	2500
4000	2000
5000	1500
6000	1000
7000	500

- a. If there were no emission fee, polluters would put _____ tons of pollutants in the air each year, and this quantity of pollutants would exceed the ability of nature to reabsorb them by _____ tons.
- b. To reduce pollution to the capacity of the atmosphere to recycle pollutants, an emission fee of \$ _____ per ton should be set.
- c. Were this emission fee set, the total emission fees set would be \$ _____.
- d. Were the quantity of pollution rights demanded at each price to increase by 500 tons, the emission fee could be increased by \$ _____ and total emission fees collected would increase by \$ _____.

■ SHORT ANSWER AND ESSAY QUESTIONS

- What are the basic characteristics of public goods?
- How do public goods differ from private goods?
- Contrast how you construct the demand curve for a public good with the procedure for constructing the demand curve for a private good using individual demand schedules.
- Explain the relationship between the marginal cost and benefit of a public good when there is an underallocation, an overallocation, and an optimal allocation of resources for the provision of the public good.

5. Describe benefit-cost analysis, and state the rules used to make decisions from marginal and total perspectives.

6. Is "economy in government" the same as "reduced government spending"? Explain the distinction.

7. What are externalities? Give examples of positive externalities and negative externalities.

8. Under what conditions might it be worthwhile for the government to intervene or not to intervene to settle an externality problem?

9. Should the government intervene in an externality dispute between two property owners over the use of one party's land? Should government intervene in the case of acid rain?

10. How do lawsuits and liability rules resolve externality problems? How would these actions be justified?

11. What actions can government take to correct for negative externalities in a market?

12. What is the tragedy of the commons? Give examples of it.

13. How do you create a market for externality rights or a cap-and-trade program in the case of pollution? What are some advantages and limitations of this approach to the pollution problem?

14. Describe some real world examples of the creation of markets for pollution rights.

15. What rule can society use to determine the optimal level of pollution abatement? What is the problem with this approach?

16. Discuss the economic issues involved in climate change and the use of a carbon tax or cap-and-trade program to reduce or mitigate the adverse effects from greenhouse gases.

17. Describe how inadequate information about sellers creates market problems for buyers. Give examples.

18. Explain what is meant by a "moral hazard problem" and describe how it affects sellers. Give some examples of the application of this problem.

19. How can the market for insurance result in an adverse selection problem? What actions might government take to correct this information problem?

20. In what way does workplace safety become an information problem? How might this problem be resolved by government or businesses?

ANSWERS

Chapter 16 Public Goods, Externalities, and Information Asymmetries

FILL-IN QUESTIONS

1. is not, can, private, public
2. quantities demanded, price, prices, quantity demanded
3. utility, returns, benefit, cost, benefit, cost (*either order for last two*)
4. benefit, cost, maximum
5. externalities, negative, positive
6. over, under
7. Coase, defined, small, minor, is not
8. property, liability, uncertainty
9. negative, decrease
10. positive, subsidizing, provision
11. decrease, increase
12. commons, market
13. a. inelastic; b. down, price; c. rise, stay the same
14. buy, less than, less than, equal to
15. climate change, increase, greater than, market
16. asymmetric, incomplete, costly, under
17. standards, licensing
18. a moral hazard, an adverse selection, after, at the same time
19. safety, standards, information
20. warranties, franchising, buyers, information

TRUE-FALSE QUESTIONS

- | | |
|--------------------|--------------------|
| 1. F, p. 336 | 14. F, pp. 342-343 |
| 2. T, pp. 337-338 | 15. T, p. 343 |
| 3. F, pp. 338-339 | 16. T, pp. 343-344 |
| 4. F, pp. 338-339 | 17. T, p. 344 |
| 5. F, pp. 339-340 | 18. F, p. 344 |
| 6. T, p. 340 | 19. T, p. 345 |
| 7. T, p. 340 | 20. F, pp. 345-346 |
| 8. T, p. 340 | 21. F, p. 347 |
| 9. F, p. 340 | 22. T, pp. 348-349 |
| 10. T, p. 340 | 23. T, pp. 349-350 |
| 11. T, p. 340 | 24. T, p. 350 |
| 12. F, p. 341 | 25. F, pp. 350-351 |
| 13. F, pp. 341-342 | |

MULTIPLE-CHOICE QUESTIONS

- | | |
|--------------------|--------------------|
| 1. d, p. 336 | 14. d, pp. 342-343 |
| 2. b, pp. 337-338 | 15. d, p. 343 |
| 3. a, pp. 337-338 | 16. c, p. 344 |
| 4. b, pp. 337-338 | 17. a, p. 345 |
| 5. a, pp. 337-338 | 18. b, pp. 345-346 |
| 6. d, pp. 338-340 | 19. c, pp. 346-347 |
| 7. b, pp. 338-340 | 20. c, pp. 346-347 |
| 8. d, pp. 338-340 | 21. b, pp. 347-348 |
| 9. b, p. 339 | 22. d, pp. 349-350 |
| 10. b, p. 340 | 23. b, pp. 350-351 |
| 11. b, p. 340 | 24. c, p. 350 |
| 12. a, p. 341 | 25. d, pp. 350-351 |
| 13. b, pp. 340-341 | |

PROBLEMS

1. a. \$12, 10, 8, 6, 4, 2; b. 4, 6; c. 8, 4, underallocation; d. 2, 10, overallocation
2. a. Marginal cost: \$500, \$180, \$80, \$100; Marginal benefit: \$650, \$100, \$50, \$25; b. yes; c. (1) 2, (2) \$500, (3) \$650, (4) \$150
3. a. under; b. over; c. Q_2 , optimal
4. a. (1) supply of, taxing, (2) decreases, increases; b. (1) graph; (2) subsidize, increase, (3) greater than, above
5. a. 4000, 2500; b. 5000; c. 7,500,000; d. 1000, 1,500,000

SHORT ANSWER AND ESSAY QUESTIONS

- | | | |
|----------------|-----------------|-----------------|
| 1. p. 336 | 8. pp. 342-343 | 15. pp. 345-346 |
| 2. p. 336 | 9. pp. 342-343 | 16. pp. 347-348 |
| 3. pp. 337-338 | 10. pp. 341-342 | 17. pp. 348-349 |
| 4. pp. 338-340 | 11. pp. 342-343 | 18. p. 350 |
| 5. pp. 338-340 | 12. pp. 343-344 | 19. pp. 350-351 |
| 6. pp. 339-340 | 13. p. 344 | 20. p. 351 |
| 7. pp. 340-341 | 14. p. 345 | |